Aalto University
School of Business

Customer value and product development courses

Multiple case study in university-industry collaboration context

Master's Thesis
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Abstract of master's thesis

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Abstract

The aim of this study is to build an understanding of customer value from the viewpoint of companies, which participate in product development project courses in university-industry collaboration. Previous customer value research has not focused on university-industry context.

The research approach of this thesis is action-oriented, as it aims to provide findings and provide both theoretical and practical implications. The empirical research was conducted as a multiple case study, and the data was gathered by conducting semi-structured interviews with companies' representatives, who participated in the course during the academic year 2015-2016. The studied course is Aalto University's Product development Project –course. In this course, multidisciplinary student teams develop a physical prototype based on the sponsoring company's brief.

The thesis first introduces the relevant customer value literature and the university-industry context. Then an existing framework for customer value dimensions is introduced, which is then utilized in the analysis of the data.

The findings suggest that companies expected and perceived value from the promised end results, the final prototype and the final report, and additional value from the course concept. The course concept includes the events, activities, and interactions between students and companies. The identified customer value attributes and outcomes provide specific, context related knowledge for the studied topic and context.

Additionally, the findings suggest that the companies with more experience with the course had more realistic expected values, compared to companies with less experience.

The findings provide both theoretical and practical implications. The findings suggest that the chosen framework provides a fruitful basis for analyzing customer value dimensions in new contexts, including university-industry collaboration. Both universities and companies can benefit from the findings.

Keywords marketing, customer value, perceived value, expected value, university-industry collaboration, product development project, product development course

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Tiivistelmä

Tämän tutkimuksen tavoitteena on lisätä ymmärrystä asiakasarvosta yritysten näkökulmasta, jotka osallistuvat tuotekehitysprojekteihin yliopistoyhteistyössä. Aikaisempi asiakasarvotutkimus ei ole keskittynyt yliopistoyhteistyöhön.

Tämän opinnäytetyön tutkimuksellinen lähestymistapa on toimintoperusteinen, sillä se pyrkii tarjoamaan havaintoja ja tarjoamaan sekä teoreettisia että käytännön implikaatioita. Empiirinen tutkimus tehtiin monitapaustutkimuksena ja data kerättiin tekemällä puolistrukturoituja haastatteluja yritysten edustajien kanssa, jotka osallistuivat kurssille lukuvuonna 2015-2016. Tutkimuksen kohteena oleva kurssi on Aalto-yliopiston Product development Project -tuotekehityskurssi. Kurssilla monitieteiset opiskelijaryhmät kehittävät fyysisen prototyypin, joka perustuu sponsorointiyrityksen kurssin alussa esittämään haasteeseen.

Opinnäytetyössä esitellään ensin aiheeseen liittyvää asiakasarvokirjallisuutta ja yliopistoyhteistyö-konteksti. Sen jälkeen esitellään olemassa oleva viitekehys asiakasarvon eri ulottuvuuksien ymmärtämiseksi, jota käytetään datan analysoinnissa.

Tulokset osoittavat, että yritykset odottavat ja kokevat arvoa kurssilla luvatuista lopputuloksista, eli toimivasta prototyypistä, sekä loppuraportista. Näiden lisäksi yritykset kokivat myös lisäarvoa kurssin konseptista. Kurssikonseptiin liittyvät esimerkiksi erilaiset tapahtumat, aktiviteetit ja vuorovaikutukset opiskelijoiden ja yritysten edustajien välillä. Tunnistetut asiakasarvoon liittyvät attribuutit ja lopputulemat antavat tarkkaa, kontekstisidoinnaista tietoa tutkitusta aiheesta ja kontekstista.

Lisäksi tulokset viittaavat siihen, että yrityksillä, jotka ovat osallistuneet kurssille useita kertoja, oli realistisempia odotettuja arvoja verrattuna yrityksiin, joilla on vähemmän kokemusta.

Tulokset tarjoavat sekä teoreettisia että käytännön implikaatioita. Tulokset osoittavat, että valittu kehys tarjoaa hedelmällisen perustan asiakasarvon analysoimiseksi uusissa konteksteissa, mukaan lukien yliopistoyhteistyön. Molemmat yliopistot ja yritykset voivat hyötyä tuloksista.

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It is, what it is. And now it is done.

Design Factoryn kirjastosta hymyssä suin,
Karri Hiekkanen

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1 Introduction

This thesis aims to widen customer value literature in an university-industry collaboration context. The research focuses on the expected and perceived customer value of companies which participate in universities' product development projects.

There is a long history in university-industry (U-I) research collaboration. In Europe, it can be first traced back to the mid- to late-1800s (Hall et al. 2001). This type of collaboration is quite common in Finland. Finnish Universities Act states in its mission statement that "the mission of the universities is to promote free research and academic and artistic education, to provide higher education based on research, and to educate students to serve their country and humanity. In carrying out their mission, the universities must promote lifelong learning, interact with the surrounding society and promote the impact of research findings and artistic activities on society" (Finnish Universities Act). University-industry collaboration, in general, serves the purpose of interacting with the surrounding society and promoting research findings in society.

University-industry collaboration has also been found to be valuable for companies. Pavitt (1998) found in his study on national science base's effect on social shaping that companies have two main advantages when participating in U-I collaboration. The first advantage is the ability of solving complex problems. The second advantage is gaining access to university personnel. In the United States, U-I collaboration has also been found to be a critical strategy response to global competition (Hall et al. 2001).

One example of university-industry collaboration is product development courses. Aalto university's *Product development Project (PdP)* is a multi-disciplinary, academic year-long course in which student teams, of around ten persons, develop a physical prototype for a sponsor company. The student teams have a 10 000 euros budget for completing the prototype, of which they are in charge of. The budget is part of the 15 000 euros fee the companies pay for participating in the course. At the beginning of the course, the companies present a short brief of a problem or a challenge they want their student team to solve. After the brief, the students oversee the project and decide working and communication methods

with the companies. The idea is not to use the students as consultants or subcontractors, but that they have the control of the direction the projects move. The only results that are promised to the companies are a functioning, physical prototype, and a final report.

While the course has its background in mechanical engineering and the outcome is a physical prototype, the aim is to get students from different fields. The course welcomes students from all Aalto University's schools (School of Engineering, School of Electrical Engineering, School of Chemical Engineering, School of Science, School of Business, and School of Arts, Design, and Architecture), each theoretically limited to 30 students, except students from the School of Engineering, which is limited to 60. This totals to 210 students. During the academic year 2015-2016, PdP had 18 teams. The sponsoring companies ranged from the largest Finnish industrial companies to small startups.

Understanding the companies perceived customer value is important and valuable for universities, as this kind of projects, in co-operation with companies, offer the students real cases, which allows the students to get a better connection into work-life scenarios. However, to get these real life cases, there have to be companies participating. With a better understanding of the expected and perceived customer value of the companies, universities can both develop current relationships and create new relationships for current and future project courses. This thesis aims to provide knowledge, which can be used to communicate more effectively with the companies as well as designing courses, which enable more value to be created.

This thesis is commissioned by Aalto University and Aalto Design Factory, which hosts multiple multi-disciplinary product development courses. This thesis is part of a larger project conducted by Aalto University: *Work life-academia relationships project*. This project aims to "strengthen the working life capabilities of students by leveraging deep industry-academia relationships in educational projects, courses, and internships."

1.1 Research gap

Customer value has been researched mostly in business-to-customer context, especially in retailing (Patterson & Spreng 1997). Business-to-business side has seen some research, but many studies have focused on the same topics with business-to-customer literature, with additional remarks on the basic differences between business-to-consumer and business-to-business relationships.

University-industry collaboration has seen some research, but mostly in the form of case studies focusing on specific and in many cases unique programs and projects. Product development courses have not been under any marketing research in almost any form, especially from companies' perspective. This is a clear gap, especially due to some unique characteristics university-industry collaborations have. These are for example different goals and funding structures.

The value companies expect and perceive when participating in product development projects organized by universities are lacking knowledge in both academic and managerial settings. This thesis aims to provide new knowledge to this gap and provide both theoretical and practical implications.

Most of the value literature, especially regarding the customer value dimensions, which can be used to categorize and analyze expected and perceived value come from business-to-consumer literature, especially from consumer research.

1.2 Research objectives and questions

This thesis' main objective is to build understanding and create a ground which can be later built up on, on the topic of expected and perceived customer value of a company participating in universities' product development courses. The academic focus is to provide new knowledge to customer value discussion by testing an existing framework in university-industry context.

This research focuses on what value companies expect and perceive when participating in these courses. The aim is not to measure or focus on how the value is created. The importance of focusing on analyzing and understanding the expected and perceived values provide a foundation for future research, which can focus for example on customer value creation in this context.

This thesis also has a managerial objective, which is to provide understanding and knowledge for Aalto University, and other universities interested in university-industry collaboration. This knowledge could be used to design better value propositions to attract companies in future to participate in product development courses and to design courses which can provide more value for all participants.

The main research question is

- What customer value companies expect and perceive when participating in product development courses in industry-university collaboration?

The empirical research focuses on Aalto university's Product development Project -course and gathers data from that. To answer the main research question, and to reach the objectives of this research, provide both theoretical and practical implications, there are several sub-questions.

The sub-questions are

- What kinds of benefits do companies expect and perceive when participating in product development courses in university-industry collaboration?
- What kinds of sacrifices do companies expect and perceive when participating in product development courses in university-industry collaboration?
- How should universities develop product development courses in order to enable more value creation for companies?

1.3 Structure

First the main topic of this thesis, customer value, is introduced. The customer value literature is first established to the specifics, which are relevant for this thesis which is then introduced more broadly. The literature review then focuses on the point of view of this thesis and is summarized to represent the starting point for the empirical part.

After the literature review, the methodology for the empirical research is introduced. In methodology chapter, the research approach and the context, university-industry collaboration, is shortly introduced, before focusing on underlying methodology and methods. The companies participating in the research and their briefs are also briefly introduced. Finally, the research limitations and reliability are discussed.

Then the findings of the empirical research are presented and discussed. Finally, the conclusions present theoretical and practical implications, followed by suggestions for future research.

2 Customer value

Customer value and its creation are central concepts of marketing and the thriving force of marketing activities (Woodruff 1997). The importance of *customer value* concept has been discussed as main the purpose of a firm (Slater 1997), and as a precursor to loyalty and customer satisfaction (Woodall 2003). The literature regarding customer value is broad and extensive (Woodall 2003), and it has not yet been established in clear and widely accepted theories.

Besides marketing literature, customer value has been discussed in other fields of research, including economics, finance, management, information systems, ethics, and philosophy (Khalifa 2004). However, Khalifa also notes that "concept of value, however, is one of the most overused and misused concepts in social sciences in general and in management literature in particular (2004, p.646)."

In marketing literature, most of the customer value research comes from consumer research. Customer value concepts have also seen some studies in business-to-business context, but mainly focusing on specific aspects. The research in a business context has focused mostly on relationships and its value (see e.g. Ulaga 2003; Ulaga & Eggert 2005), especially on buyer-supplier relationships (see e.g. Wilson & Jantrania 1994; Ravald & Grönroos 1996). However, even this has not been studied extensively, as Ulaga points out, that "empirical research focusing on relationship value in business markets from a customer perspective is limited to a few studies" (Ulaga 2003, p.678).

One of the aspects of customer value in which researchers commonly agree is that it is determined by the beneficiary (Vargo & Lusch 2004). In business-to-business and university-industry contexts there are always people who determine the customer value, so the customer value research, which is also based on consumer research, can be applied in these contexts. However, Woodall (2003) notes that business-to-business customers evaluate value more pragmatically and have an emphasis on the business results, and are rational towards desired outcomes. This can also be extended to university-industry collaboration context, as universities can be seen as businesses, due to having organizational structures.

The lack of business-to-business specific research and the idea that value is always determined by the beneficiary justify the focus on the general customer value literature, even though it is heavily based on consumer research.

2.1 Value-to-the-customer

In marketing literature, customer value has seen much research from different perspectives and different literature streams. These include pricing, consumer behavior, relationship marketing, total quality management, and strategy (de Chernatony et al. 2000). The research has discussed *customer value* from two different perspectives (Ulaga & Eggert 2005). The authors used terms "value-to-the-customer" and "value-of-the-customer" to separate these perspectives. Value-to-the-customer looks value from customer's perspective, while value-of-the-customer looks at the value of the customer from a firm's perspective. Recently, customer lifetime value (CLV) has been widely used to reference to the value-of-the-customer (Woodall 2003). In this research, the focus is on the value-to-the-customer perspective.

Researches focusing on the value-to-the-customer have used many terms to refer to the same concept. These terms include, but are not limited to: customer value (e.g. Woodruff 1997), perceived value (e.g. Zeithaml 1988), customer perceived value (e.g. Grönroos 1997), and value for the customer (VC) (e.g. Woodall 2003). While the definitions are not the same, the concept behind them is the same (Woodall 2003). From here on the term *customer value* is used in this thesis, as it is according to Woodall (2003) the most used term on customer value related literature and contains words *customer* and *value*, which are parts of many other terms (e.g. customer perceived value).

Next, the customer value literature focusing on the value-to-the-customer is introduced broadly through different conceptualizations and literature reviews. The literature is then built towards the point of view of this thesis. From here on, the customer value refers to the value-to-the-customer perspective.

2.2 Value-in-use

Value has been discussed and researched from two main perspectives since Aristotle. Vargo and Lusch call these perspectives as value-in-exchange and value-in-use (Vargo & Lusch 2004).

Value-in-exchange sees that a product has utility embedded in it, and is the way *Goods-Dominant Logic (G-D Logic)* examines value (Vargo & Lusch 2004). This view was inherited from economics, and it essentially views value in solely on monetary terms or value-added (Vargo et al. 2010). This is how value is viewed in Porter's (1985) famous value chain. In his value chain model, there are primary and supportive activities, which each add value to a product. However, there is no customer in this chain. The customer is seen as a destructor of value, rather than as a co-creator (Vargo et al. 2008).

Value-in-use on the other sees that "value is created when customers use goods and services" (Grönroos 2008, p.303). Vargo and Lusch note that "there is no value until an offering is used; experience and perception are essential to value determination" (Lusch & Vargo 2006, p.44).

While these two ways of looking at value are very different, they can be both used to examine value. While value-in-exchange is very limited, it can be used to learn about a marketplace, as it is visible in our monetary system (Lusch & Vargo 2006). Value-in-exchange has also been suggested to be a function of the value-in-use (Ravald 2001; Grönroos 2008). Grönroos (2008) highlights the importance of value-in-use perspective. In "applying the terms value-in-use and value-in-exchange, the former is more important than the latter. If customers cannot make use of a good, value-in-exchange is nil for them. Since they have paid good money for nothing, it is negative. Only during consumption, realized value in the form of value-in-use is created" (Grönroos 2008, p.304). In this thesis, the focus is on the value-in-use perspective on value.

2.3 Customer value literature streams

There are several literature reviews on customer value (focusing on value-to-the-customer and value-in-use perspectives) and attempts to conceptualize it (Woodall 2003; Khalifa 2004; Sánchez-Fernández & Iniesta-Bonillo 2007; Gummerus 2013). All authors noted that the customer value literature is complex and lacks clarity and consistency. Gummerus (2013) noted this at the introduction of her article that "it [customer value as a concept lacks clarity] is revealing that the previous conceptual studies on value (Woodall 2003; Khalifa 2004; Sánchez-Fernández & Iniesta-Bonillo 2007) have all ended up with different types of conceptualizations" (Gummerus 2013, p.2).

Gummerus (2013) review a wide range of literature related to customer value. She identified "two main, high-level literature streams: value creation processes and value outcome determination" (2013, p.3). As the aim of this study is to provide an understanding of the expected and perceived customer value, the literature focuses on the latter: value outcome determination (bolded in Figure 1).

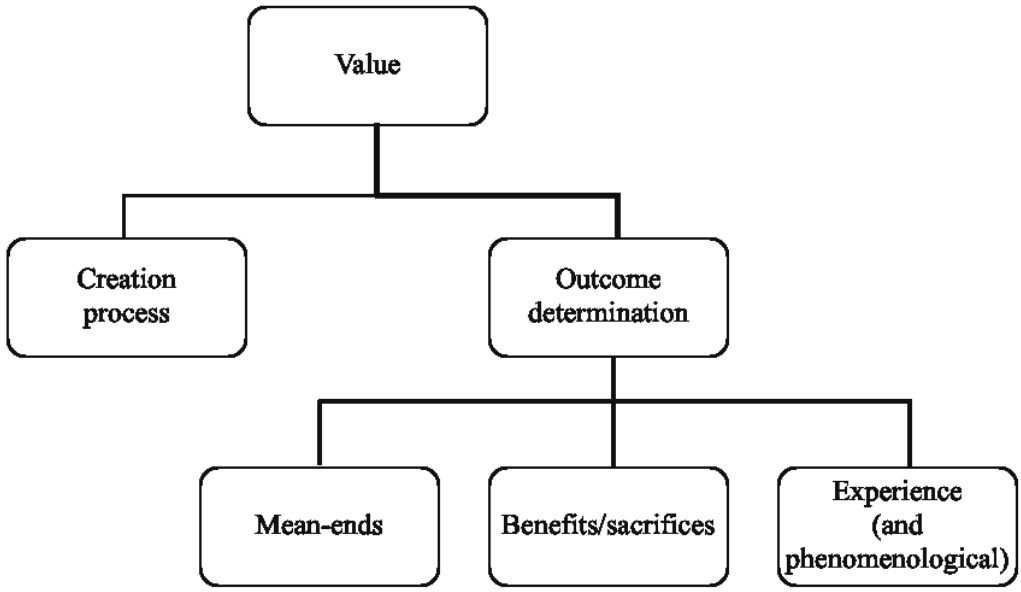

Figure 1. Value theory categorization (Modified for this thesis from Gummerus 2013)

Gummerus (2013) identified three categories for value outcome determination logics, which are in line with the previous literature reviews (Woodall 2003; Sánchez-Fernández & Iniesta-Bonillo 2007). These are value as means-ends, value as benefits/sacrifices, and value as experience outcomes. The author also identified a fourth category: value as phenomenological, but in this thesis, it is grouped to value as experience outcome, as it is very similar to it. While this thesis focuses on the benefits/sacrifices perspective, other categories which Gummerus (2013) identified in the most recent literature review are introduced.

2.3.1 Value as means-ends

Value as means-ends is “based on the assumption that customers acquire and use products or services to accomplish favorable ends” (Khalifa 2004, p.653). The foundational idea of this approach is that the customer knows their desired end states and then adjust their behavior accordingly. This approach focuses on "linkages between product attributes, consequences produced through consumption, and personal values of consumers underlie their decision-making processes (Gutman,1991)” (Huber et al. 2001, p.42).

Woodruff's definition of customer value: "customer value is a customer's perceived preference for, and evaluation of those product attributes, attribute performances, and consequences arising from use that facilitates (or block) achieving the customer's goals and purposes in use situations" (Woodruff 1997, p.142) is “anchored in a conceptual framework provided by a means-end type of model” (Woodruff 1997, p.142).

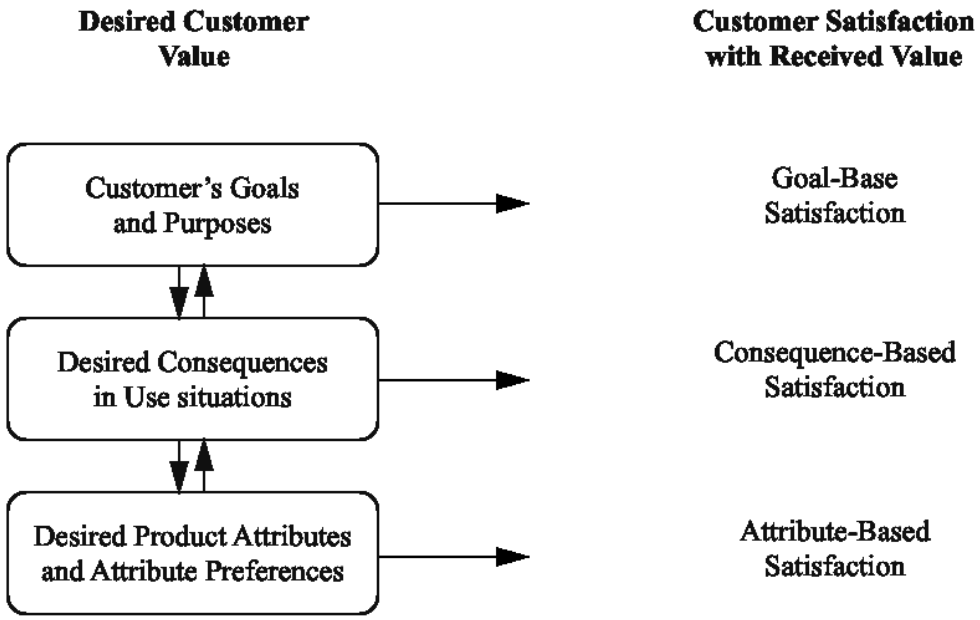

Figure 2. Customer Value Hierarchy Model (Woodruff and Gardial 1996)

Woodruff and Gardial (1996) introduced a customer value hierarchy model (Figure 2), which showcases three levels of desired customer value. The lowest level focuses on product attributes, which are the most objective and they can be defined (e.g. memory on a computer). The middle level focuses on the desired consequences in use situations, which are subjective to the consumer's desires. The top level is the most abstract and considers customer's personal goals and purposes.

Means-end perspective and customer value hierarchy model are based on consumer research. While Khalifa found that "the means-ends models of customer value fill a gap in the literature by being able to explain why customers attach different weights to various benefits in evaluating alternative products/services" they also "fail to pay sufficient attention to the sacrifices a customer is likely to bear in acquiring, using, or disposing of the product/service" (Khalifa 2004, p.655). This and the focus on consumers' personal goals are not supportive of the goal of this thesis and its context.

2.3.2 Value as experience outcome

Value as experience outcome perspective "aims to supplement and enrich the view of customers as logical decision makers by seeing humans as emotional sensation-seekers" (Gummerus 2013, p.10). Holbrook (2005) offers a definition of customer value which focuses on experience outcome: "[customer value is] (1) interactive, (2) relativistic, (3) preference, and (4) experience" (2005, p.46). This definition aims to capture all aspects of customer value. Interactivity refers to the relationship that is built between the customer and the product or service. Relativistic aspect refers to the idea that customers compare the product or service with other offerings. Preference towards a product or a service can be expressed with "terms as like/dislike, favorable/unfavorable, good/bad, positive/negative, pro/con, or approach/avoid" (Holbrook 2005, p.46). Finally, experience refers to the consumption experience, which can be for example feeling amused by consumption. While this definition is broad and aims to capture all aspects, it can be difficult to understand and use (Smith & Colgate 2007).

The fourth category Gummerus (2013) identifies, value as phenomenological, is very close to the value as experience outcome perspective. It is based on Service-Dominant Logic (S-D Logic) and its 10th foundational premise: "value is always uniquely and phenomenologically determined by the beneficiary" (Vargo & Lusch 2008, p.7). Gummerus' (2013) distinction between value as experience outcome and value as phenomenological points out that the former focuses on the experiences of a consumer and the latter on more holistic experience including the context. The distinction is small and abstract. Ng and Smith (2012) combines these categories and discussed value as a phenomenological experience.

Besides value as experience outcome or as phenomenological experience perspectives being abstract, these perspectives, in general, do not take sacrifices into account. Gummerus notes that "this stream [value as experience outcome] does not assume that a customer would constantly calculate trade-offs between benefits and sacrifices" (Gummerus 2013, p.11). The abstract nature of value as experience outcome and the lack of rational calculation make it very unusable and is not utilized in this thesis, as business-to-business customers evaluate value more pragmatically are rational towards desired outcomes (Woodall 2003).

2.3.3 Value as benefits/sacrifices

Value as benefits/sacrifices research stream "views value as a cognitive judgment of utility made by a customer based on inputs (benefits) and outputs (sacrifices)" (Gummerus 2013, p.9). One of the most cited papers on this topic is the seminal work done by Zeithaml (1988). The author noted four patterns in an exploratory study: "(1) value is low price, (2) value is whatever I want in a product, (3) value is the quality I get for the price I pay, and (4) value is what I get for what I give" (1988, p.13). The author captured the four patterns into one overall definition: "Value is the consumer's overall assessment of the utility of a product based on perceptions of what is received and what is given" (1988, p.14). This definition focuses on the idea that the customer perceives the utility and assesses it rationally with the benefits and sacrifices.

Ulaga (2003) identified four recurring themes in definitions in this category: "(1) Customer value is a subjective concept, (2) it is conceptualized as a trade-off between benefits and sacrifices, (3) benefits and sacrifices can be multi-faceted, and (4) value perceptions are relative to competition" (Ulaga 2003, p.678). Ulaga and Eggert (2005) also note that "on a high level of abstraction, customer value is defined as the trade-off between the benefits ("what you get") and the sacrifices ("what you give")" (2005, pp.75–76). This thesis builds up on this view. This is backed by that is proposed as "the most popular conceptualization in marketing" (Patterson & Spreng 1997, p.416) and still widely in use (see e.g. Moliner 2009).

While this perspective might be the most popular, Smith and Colgate (2007) noted that "it is still not clear whether customer value is a summative (benefits less sacrifices) or ratio (benefits divided by sacrifices) based evaluation or whether it is made with compensatory or non-compensatory decision rules" (2007, p.8). These questions were initially brought up by Parasuraman (1997) in his well-cited article *Reflections on gaining competitive advantage through customer value* on Woodruff's original article *Gaining competitive advantage through customer value* (Woodruff 1997).

There are some attempts to define this perspective in business contexts. Anderson et al. (1992) define value in business markets as "the perceived worth in monetary units of the set of economic, technical, service, and social benefits received by a customer firm in exchange for the price paid for a product offering, taking into consideration the available alternative suppliers' offerings and prices." This view is more from the value-in-exchange perspective, as the definition focuses on the worth in monetary units. This does not offer a framework for understanding customer value, but focuses on measuring it. As this thesis does not aim to measure the value, but to gain understanding of it, the Zeithaml's (1988) definition of customer value is applied.

Next, benefits/sacrifices perspective is introduced further by focusing on benefits and sacrifices, value dimensions, and on expected and perceived value.

2.3.3.1 Benefits and sacrifices

Benefits a customer assess can be anything he or she values. In previous literature, the benefits range from social, know-how and time-to-market (Ulaga 2003) to several quality dimensions (Patterson & Spreng 1997) to valuable relationships (Grönroos & Ravald 2011). There is no possibility to list all benefits a customer assesses, as customer value is a subjective concept (Ulaga & Eggert 2005), but Woodall (2003) combined different benefits and sacrifices previous research had identified (Table 1). The author divided benefits into attributes and outcomes.

BENEFITS		SACRIFICES
Attributes	**Outcomes**	
Perceived quality	Functional benefits	Price
Product quality	Utility	Market price
Quality	Use function	Monetary costs
Service quality	Aesthetic function	Financial
Technical quality	Operational benefits	Costs
Functional quality	Economy	Costs of use
Performance quality	Logistical benefits	Perceived costs
Service performance	Product benefits	Search costs
Service	Strategic benefits	Acquisition costs
Service support	Financial benefits	Opportunity costs
Special service aspects	Results for the customer	Delivery and installation costs
Additional services	Social benefits	Costs of repair
Core solution	Security	Training & maintenance costs
Customization	Convenience	Non-monetary costs
Reliability	Enjoyment	Non-financial costs
Product characteristics	Appreciation from users	Relationship costs
Product attributes	Knowledge, humour	Psychological costs
Features	Self-expression	Time
Performance	Personal benefits	Human effort
	Association with social groups	Effort
	Affective arousal	

Table 1. Benefits and Sacrifices (Woodall 2003)

The outcomes, which this thesis focuses on, are for example financial, social, and functional. On the sacrifice side, besides the usual sacrifice, money, the sacrifice component also includes non-monetary factors (Butz & Goodstein 1996). The sacrifices listed in Woodall's table (Table 1) can also be divided into monetary and non-monetary. Non-monetary sacrifices can be for example time and effort, which are needed to acquire and use a product or a service.

2.3.3.2 Expected and perceived value

Customer value can also be examined at different times: as a "pre- or post-purchase construct" (Eggert & Ulaga 2002, p.110). In this thesis, these are referred to as expected customer value and perceived customer value.

The expected value consists of the expected benefits and sacrifices before purchase and consumption of a product or a service. This concept is closely related to customer value proposition and can be influenced by it. Customer value proposition is "an encapsulation of a strategic management decision on what the company believes its customers value the most and what it can deliver in a way that gives it competitive advantage" (Rintamäki et al. 2007, p.624). The perceived value consists of the benefits and sacrifices a customer perceives during or after the purchase and consumption of a product or service.

2.4 Value dimensions

Value as benefits/sacrifices perspective sees that the customer assesses the customer value rationally (Gummerus 2013). This allows it to be studied empirically. However, it can be very hard to measure beyond monetary terms, as it is uniquely assessed by the beneficiary (Vargo & Lusch 2008). Smith and Colgate (2007) noted that "it is possible, however, to understand the categories or dimensions on which such assessments are made" (2007, p.8). This understanding can be very valuable in the creation of value propositions (Rintamäki et al. 2007), which is all a producer can offer as value is co-created (Vargo & Lusch 2004).

Sheth et al. (1991) described five types of value that drive consumer choice: functional value, social value, emotional value, epistemic value, and conditional value. Functional value refers to the functional benefits or utility a product or service provides. The authors note that "traditionally, the functional value is presumed to be the primary driver of consumer choice" (1991, p.160). Social value refers to what social values a product or service offers. This kind of value can be for example image and brand related. Emotional value refers to the emotions a product or a service might bring up. This can be for example pleasure by choosing more ethical offering. Epistemic value refers to value brought up by change and new experiences. For example, a customer might choose some product or service over another just to try something new. Conditional value is heavily related to the context. This refers to a value that is experienced through condition, for example, emergency situations. While the types of value Sheth et al. (1991) are extensive, there are "other functional, experiential, and symbolic

dimensions of customer value that are not captured in this framework" (Smith & Colgate 2007, p.9).

Ulaga (2003) conducted a grounded theory research in business-to-business relationships and identified eight categories of value: product quality, delivery, time to market, direct product costs (price), process costs, personal interaction, supplier know-how, and service support. The research focused solely on manufacturer supplier relationship. The categories are introduced more in detail with 3 or 4 benefits in each category in figure 3 below. Smith and Colgate found that the "framework is quite comprehensive in delineating relationship value, but there are other types of customer perceived or received value in a business-to-business context" (2007, page 9).

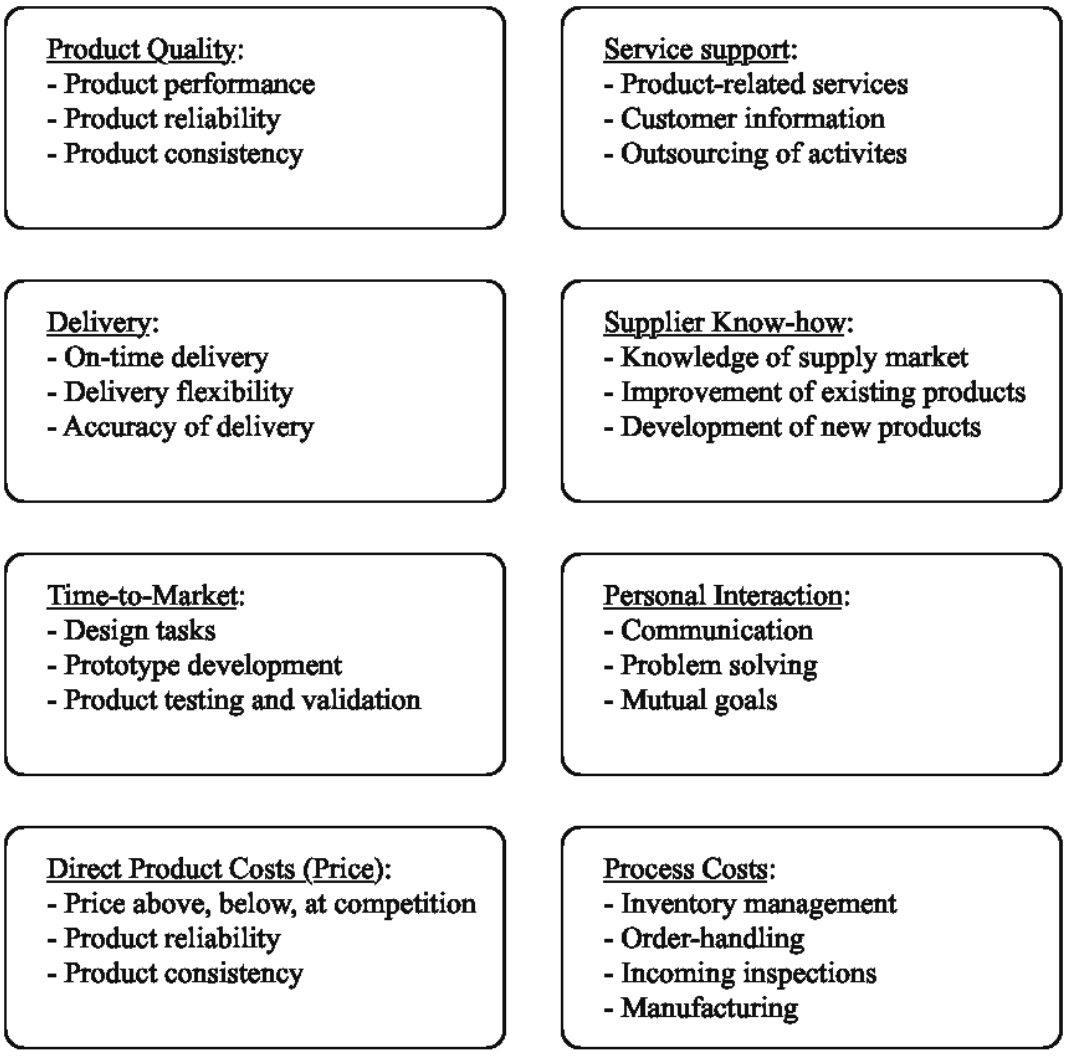

Figure 3. Relationship value drivers (Ulaga 2003)

Woodall (2003) identifies five primary forms of value for a customer (which he refers to as VC) from previous research. These are net VC, derived VC, marketing VC, sale VC, and rational VC. The author defines net VC as "a utilitarian balancing of benefits and sacrifices," marketing VC as "perceived product attributes," derived VC as "use/experience outcomes," sale VC as "low price, or reduction of sacrifice" and rational VC as "benefits expressed in units of exchange." Smith and Colgate (2007) noted that "this framework [Woodall's] is the most comprehensive of previous works" (2007, page 9), as Woodall identifies many specific types of value, the categories had overlap in them, and that due to the absence of clear definitions of the customer value subtypes, the framework is difficult to use in practice.

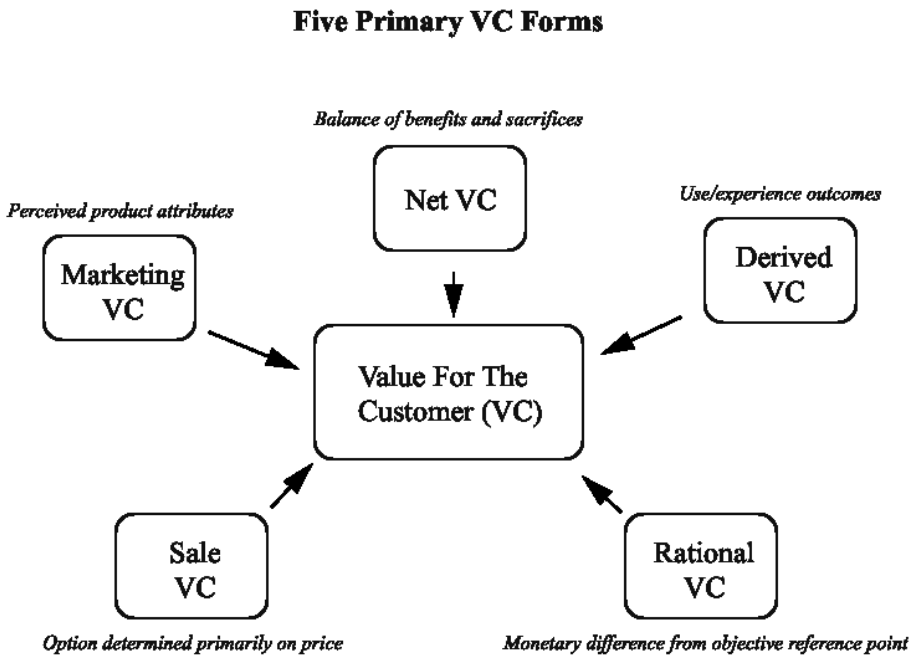

Figure 4. Five Primary VC Forms (Woodall 2003).

Holbrook (2005) identified eight types of customer value: efficiency, excellence, play, aesthetics, status, esteem, ethics, and spirituality. The author's typology is based on three dimensions: extrinsic and intrinsic values, self- and other-oriented values, and active and reactive values. Extrinsic and intrinsic value refer to means-end and experience respectively. Self- and other-oriented values refer to the effect on me, [the customer] and others

respectively. Moreover, finally, active and reactive values refer to the manipulation of a product and more distant view of a product respectively.

	Extrinsic	Intrinsic
Self-oriented		
Active	EFFICIENCY (O/I ratio)	PLAY (Fun and Leisure)
Reactive	EXCELLENCE (Quality)	AESTHETICS (Beauty)
Other-oriented		
Active	STATUS (Impression)	ETHICS (Justice, Virtue and Morality)
Reactive	ESTEEM (Possessions)	SPIRITUALITY (Sacredness)

Figure 5. Typology of customer value (Holbrook 2005)

Smith and Colgate note that "although this typology [Holbrook's] has a clear conceptual basis, it is consumer outcome and meaning-focused, does not fully capture the domain of the customer value construct, and may not apply as well to business-to- business contexts" (2007, page 9).

In response to the previous works, Smith and Colgate (2007) introduced a framework which "adopts a strategic orientation in that the focus is on identifying categories of value that could differentiate offerings" (2007, p.10). Regarding the usability of the framework, they note that they aim "to develop a comprehensive framework applicable to consumer and business contexts, and goods as well as services. The specific benefits and sacrifices considered in an overall assessment of value are known to differ in these different contexts, but we suggest that the categories of value are the same" (2007, p.10). The authors identified four major types of value: functional/instrumental value, experiential/hedonic value, symbolic/expressive value, and cost/sacrifice value.

Rintamäki et al. (2007) used similar dimensions (albeit using slightly different terms) as Smith and Colgate (2007) in their research into value propositions in retail space. The authors called the value dimensions: economic customer value, functional customer value,

emotional customer value, and symbolic customer value. They developed a framework for identifying competitive customer value propositions. The authors introduced a hierarchical take on the value dimensions, ranging from “more objective to more subjective, from more concrete to more abstract, from more utilitarian to more hedonic/psychic, and from more transaction-based to more interaction-based” (Rintamäki et al. 2007, p.624).

The dimensions suggested by Smith and Colgate (2007) have been used in recent studies. For example, Tynan et al. (2010) utilize Smith and Colgate's (2007) framework in their study on co-creation of value regarding luxury brands. They introduced fifth value: relational value. This focuses on the relationship with the brand or service provider (Grönroos 2006).

This thesis applies the dimensions suggested by Smith and Colgate (2007). Next, the four dimensions are introduced, with short examples regarding product development and final prototypes.

2.4.1 Functional/instrumental value

Functional/instrumental value (functional value in Rintamäki et al. 2007)) is "concerned with the extent to which product (good or service) has desired characteristics, is useful or performs the desired function" (Smith & Colgate 2007, p.10). The products and services which provide functional/instrumental value must meet the customer’s needs and be useful for the customer. Sánchez-Fernández and Iniesta-Bonillo (2007) describe, that functional value “pertains to whether a product is able to perform its functional, utilitarian, or physical purposes” (Sánchez-Fernández & Iniesta-Bonillo 2007, p.438).

Functional/instrumental values can be for example utilitarian value (Woodall 2003) and product quality (Ulaga 2003). In the context of product development, the functional/instrumental benefits can be for example the final prototype's performance and functions.

2.4.2 Experiential/hedonic value

The experiential/hedonic value (emotional value in Rintamäki et al. 2007)) "is concerned with the extent to which a product [or a service] creates appropriate experiences, feelings, and emotions for the customer" (Smith & Colgate 2007, p.10). While this dimension of value was first discussed in the context of shopping (Babin et al. 1994), services can offer this type of value also, especially in long product development projects.

Experiential/hedonic values can be for example epistemic value (Sheth et al. 1991) and aesthetics (Holbrook 2005). In the context of product development, this can be for example experiencing something new during the project.

2.4.3 Symbolic/expressive value

Symbolic/expressive value (symbolic value in Rintamäki et al. 2007)) "is concerned with the extent to which customers attach or associate psychological meaning to a product [or service]" (Smith & Colgate 2007, p.10). This can be done on an individual level, or at a firm level when company representative aims to associate the company with a product or service. Besides attaching meaning to self, Rintamäki et al. (2007) note that symbolic/expressive value can also be defined as a positive consumption meaning which is communicated to others.

Symbolic/expressive values can be for example association with a brand (Woodall 2003) and desired ethics (Holbrook 2005). In the context of this thesis, this can be for example the meaning that collaborating with the students, with the course, and with the university.

2.4.4 Cost/sacrifice value

Cost/sacrifice value (or economic value (Rintamäki et al. 2007)) is concerned with the aim "to minimize the costs and other sacrifices that may be involved in the purchase, ownership, and use of a product" (2007, p.13). While, costs are mostly associated with monetary terms, like price, "a full appreciation of the concept also includes considerations of the time, effort

and search involved in the overall cost or sacrifice made by the customer in the consumption experience" (Sánchez-Fernández & Iniesta-Bonillo 2007, p.429).

Cost/sacrifice value can be for example low cost (Zeithaml 1988). In the context of product development, this can be for example the sacrifices relative to the potential benefits or perceived benefits.

2.5 Summary

The customer value literature is extensive and has many different conceptualizations and definitions. The relevant literature is now summarized, to capture the main concepts and ideas used in the empirical research.

The customer value literature can be divided to examine value-of-a-customer and value-to-the-customer (Ulaga & Eggert 2005). This thesis focuses solely on the value-to-the-customer perspective, which examines the customer value from the customer's perspective: what value companies expect and perceive.

The literature shows that customer value is a subjective concept and determined by the beneficiary (Ulaga & Eggert 2005; Vargo & Lusch 2008). It is conceptualized as a trade-off between benefits and sacrifices (Zeithaml 1988; Butz & Goodstein 1996; 2003; Khalifa 2004; 2013), which can be multi-faceted (Sheth et al. 1991; Ulaga & Eggert 2005; Rintamäki et al. 2007; Smith & Colgate 2007). Customer value is hard to measure, but it can be understood through different customer value dimensions (Smith & Colgate 2007).

The customer value dimensions, which are used in the empirical study are functional/instrumental value, experiential/hedonic value, symbolic/expressive value, and cost/sacrifice value (Smith & Colgate 2007). These value dimensions can be examined pre- or post-purchase (Eggert & Ulaga 2002). In this thesis, these are referred to as *expected value* and *perceived value*.

While there are no university-industry specific customer value frameworks, and business-to-business context has not seen any widely-accepted research on value dimensions, the Smith and Colgate's (2007) framework is utilized on the empirical side of this thesis. It is developed to work in both business-to-customer and business-to-business contexts, as well as for goods and services, which are both present in the Product development Project, from which the data is gathered from. The framework developed by Smith and Colgate (2007) aims to include all value dimensions and provide an understanding of the customer value, which is in line with the goal of this thesis: examine customer value from product development courses in university-industry collaboration.

3 Methodology

In this chapter, the research approach and context, chosen methodology and methods are introduced. First, the research context is introduced broadly. Second, the research approach is introduced to position this research. Third, the chosen methodology is introduced in more detail, including data collection and analysis. After that the cases are briefly introduced, followed by limitations and reliability.

3.1 Research context

The research context of this thesis is university-industry (U-I) collaboration, more specifically product development project courses. University-industry collaboration has some unique features, which differentiate it from business-to-business context.

Ideally, university-industry collaboration is beneficial for both parties. These actors share some common goals, mainly, that both parties aim to create new knowledge. However, there are differences to what use this knowledge is created for. While universities aim to educate students, and other stakeholders, companies' main aim is to gain competitive advantage (Partha & David 1994).

The motivation for participating in university-industry collaboration also has some differentiating aspects. Like mentioned earlier, companies aim to gain competitive advantage and they may look for this in U-I collaboration to be able to solve complex problems and to gain access to university personnel (Pavitt 1998). U-I collaboration can be a beneficial place for companies to conduct additional product development, as Rosenberg and Nelson (1994) found in their study looking at American universities and industries that "what university research most often does today, is to stimulate and enhance the power of R&D done in industry, as contrasted with providing a substitute for it (1994, p.340)."

University motivation seems to be more involved in the finances (Hall et al. 2003). This study was conducted in the US, so the structure of university funding is different compared

to Finland. While funding from companies might not be as large in Finland, as it is in the US, it is a fundamental part of the funding in Finnish universities. For example, even though universities are mainly government funded in Finland, Aalto University, one of the largest universities in Finland, received 10% of its funding in "other funding" category, which includes private companies and foundations (Aalto University's key figures and annual reports). Recently, universities are also more proactive in seeking to create intellectual property to foster technology faster (Bruneel et al. 2010).

While the most common form of university-industry collaboration is research, product development courses have become more popular lately. Practically in these courses student teams solve real product development problems, challenges or briefs, which are introduced by sponsoring companies. The data for this research is gathered from Aalto University's Product development Project, which was introduced in the introduction.

Some unique challenges also arise with product development courses. When looking at the relationship between the sponsoring company and the participating students, the company formally in a relationship with the university or a department of it, not with the actual students. This results that there is no clear authority in decision making after a product development course has been established. This can be established with more predefined contracts, but the nature of innovation driven product development courses is open and vague, compared to subcontracting a specific product.

These aspects are unique to university-industry collaboration, and a better understanding of the nature of the collaboration can provide better results. Recent research has found that the success of university-industry collaboration has been found to correlate with previous experience (Bruneel et al. 2010).

3.2 Research approach

As this thesis aims to provide both theoretical and practical implications, the research approach of this thesis is action-oriented. The aim of action-oriented approach is to "achieve

a profound understanding of the behavior of people in real-world organizations" Pihlanto 1994, p.373). Action-oriented research approach brings a human being into the focus of analysis, and the emphasizes on "gaining a thorough understanding of the studied subjects, but the purpose may include an active participation in change processes, too" (Kasanen et al. 1993, p.256). These descriptions fit the nature of this thesis, as it is commissioned by Aalto and has a clear managerial side.

Kasanen et al. (1993) introduced a research approaches map, which describes different approaches in theoretical-empirical and descriptive-normative axes. The action-oriented approach is located on the empirical side of the theoretical-empirical axes and at the middle of the descriptive-normative axes (bolded in Figure 6, below). It differs from the nomothetical approach, which aims to provide findings in the form of general laws and from a constructive approach, which always aims to "demonstrate the practical usability of the constructed solution" (Kasanen et al. 1993, page 256). The action-oriented approach aims to provide knowledge, which is both actionable and generalizable.

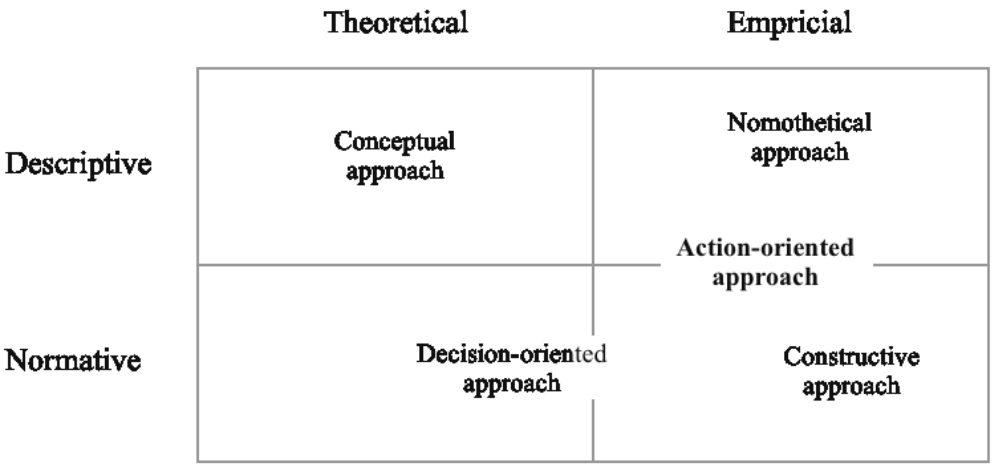

Figure 6. Research Approaches (Modified to reflect this thesis from Kasanen et al. 1993)

Kasanen et al. (1993) note that the application of a case study method in the empirical phase of the action-oriented studies is common. Next, the case study, including data collection and analysis, and the paradigm of this research are introduced in more detail.

3.3 Methodology and methods

Before discussing the methodology and methods in detail, some philosophical aspects are introduced to understand the paradigm of this research. The paradigm is formed by ontology (the essence of being) and epistemology (what knowledge is). (Eriksson & Kovalainen 2008)

3.3.1 Ontology and epistemology

Ontological thinking focuses on how reality is formed. Reality can be understood as an objective reality, in which it is independent of people, or as a subjective reality, in which it is constructed by people through social interactions. As stated in the literature review (Chapter 2) current concepts about the value and its creation state that value is always co-created (Vargo & Lusch 2004), which is a view this thesis focuses on. This leads to a subjective ontological perspective on the reality. This is subjective reality is also referred to as constructionism (Eriksson & Kovalainen 2008).

Epistemological thinking focuses on understanding what knowledge is. Like ontology, epistemology has objectivist and subjectivist views. Objective epistemological view understands knowledge as unchanging, as something that exists in the world on its own. Subjective view understands knowledge as observed and interpreted. This thesis is to understand knowledge as subjective and is in line with the idea that value is always defined uniquely by the recipient (Vargo & Lusch 2008).

3.3.2 Methodology and method

The methodology focuses on knowledge more practically. As the aim of this study is to gain understanding on the types of value customers experience, a qualitative methodology is appropriate for this thesis (Eriksson & Kovalainen 2008). The method chosen is a multiple case study.

The case study method, as according to Yin (2009), it suits well for understanding phenomena in real-life context. Yin (2009) also suggests that multiple case study should be chosen over single case study, if possible. As the aim of this thesis is to understand customer value in a specific context, on a general level rather than on company-specific level, multiple case study method is a logical choice.

Case studies can be roughly divided into intensive and extensive case studies. While the intensive case study aims to provide understanding on a unique case, an extensive case utilizes multiple cases to elaborate, test or generate theories and frameworks. As product development project courses are not unique but lack research, this thesis is an extensive case study in nature. (Eriksson & Kovalainen 2008)

Pihlaja notes that "a researcher aiming to conduct a sound action-oriented case study should recognize the essential role of the actors in creating their own external world, rather than considering the world as something 'out there'" (1994, p.377). This is in line with the previously introduced paradigm of this study.

Part of the methodology is more specific methods, which are tools to understand the studied phenomenon. These methods are often divided into data collection and data analysis (Eriksson & Kovalainen 2008), which are introduced in more detail next.

3.3.2.1 Data collection

The empirical data on by conducting semi-structured single person interviews. Two preliminary interviews were conducted to understand the course and to gain information on which companies should be chosen as the cases. The interviews were with the professor in charge of the course and a teaching assistant for the course, who was also involved in acquiring the companies for the course.

After the preliminary interviews had been conducted, six companies were chosen to be interviewed for the main empirical study. From each of the companies, a representative was interviewed, who was involved with the course.

These companies were chosen due to their similarities in both industry background and experience with the course, to improve the quality of the data. All the companies are middle sized to large Finnish industrial companies, which participated in Product development Project course during the academic year 2015-2016, which most of the questions concerned. All the case companies had also participated at least once before. Companies, with previous experience, were chosen due to an assumption that they had perceived some value from the course, as they chose to participate again.

The companies which were interviewed were: Kone, Konecranes, Marioff, Outotec, Ray (now a days Veikkaus) and Vaisala. The companies, and the briefs they introduced for their teams are introduced in cases section.

3.3.2.2 Data analysis

The interviews were recorded and transcribed. This resulted in roughly 125 pages of transcriptions. A deductive content analysis was conducted (Elo & Kyngäs 2008), which involves systematic coding, which is justified as the thesis aims to test existing framework regarding customer value in a new context, and so offer improvements and new knowledge (Eriksson & Kovalainen 2008).

According to Eriksson and Kovalainen "coding means that the features, instances, issues and themes in empirical data are classified and given a specific label" (Eriksson & Kovalainen 2008). The categories for coding were chosen according to the value dimensions discussed in the literature review, which are: functional/instrumental value, experiential/hedonic value, symbolic/expressive value, and cost/sacrifice value. The same categories were used for coding both expected and perceived values. This method, when using categories from existing framework as the basis, is a deductive approach to coding.

A content analysis was then performed using the categories. An Excel sheet was prepared with companies and categories. The result was 187 data points. Due to subjectivism view into epistemology only the manifest content was analyzed, rather than latent content, such as hymns, pauses and so on (Elo & Kyngäs 2008).

3.4 Cases

Next, the case companies and their briefs for their teams are introduced briefly. Each of the case companies participated in PdP during the academic year 2015-2016 and at least once before.

All companies agreed that the company names are visible, but as requested by some of the representatives, direct quotations are not linked to specific companies.

Company	**# of participations by company**	**# of participations by the interviewee**
Kone	18	8
Konecranes	9	2 (and once as a student)
Marioff	2	1 (and once as a student)
Outotec	5	4
Ray (Veikkaus)	3	1,5 (half of the previous course and once as a student)
Vaisala	5	4

Table 2. Case companies and number of participations (company and representative level)

The representatives from Marioff and Outotec mentioned that they were not involved with the technical part of the project and that there were engineering departments who took control of the projects' technical aspects regarding the final prototype.

3.4.1 Kone

Kone manufactures elevators, escalators and automatic building doors, and provides solutions for maintenance and modernization. Kone's brief for the 2015-2016 PDP course was to come up with a new elevator doors. The brief was very wide, and the only requirement

was that the doors would be as space efficient as possible. The challenge presented in brief is something Kone is working on itself but wanted to get fresh, outside of the box ideas.

3.4.2 Konecranes

Konecranes manufactures different types of cranes for industrial use and provides maintenance services and port solutions. The brief for the 2015-2016 PdP course was to come up with a solution on how Konecranes' standard crane could be utilized in concrete 3D printing. Technically this involved figuring out how to attach a concrete 3D printing head to the company's crane and to solve problems which are related to this. The 3D concrete printer head came from a partner company. The brief was quite specific with predetermined technology but allowed students to come up with multiple solutions. The same challenge has been though also inside the company, and the aim was to get ideas and possible solutions on how this problem could be solved.

3.4.3 Marioff

Marioff manufactures water mist fire protection solutions for buildings, industrial applications, and large vessels, and provides supportive services like maintenance. Marioff's brief was to figure out if a new technology called cool gas generator could be utilized in the creation of the water mist and possibly create a new line of products for new, smaller segments in which the company currently does not offer solutions, like small restaurant kitchens. The brief was specific as it provided the technology and the final state of validating if the technology can work in this type of product. The challenge was thought exclusively for the course from a technology that was introduced to the company earlier but had not yet seen any applications.

3.4.4 Outotec

Outotec manufacturers and provides machines and technologies for the metal and mineral industries, and offer operational and maintenance services. The main challenge of the brief

was to come up with new ideas on how modular facilities, which are in containers, could be moved in difficult environmental conditions. The brief was very open and didn't provide any predefined technologies to solve the problem. The challenge is part of a larger project conducted inside the company.

3.4.5 Ray

Ray, or Raha-automaattiyhdistys, was a not-for-profit gambling company, which is now part of the Veikkaus Oy when it merged with other gambling companies in 2017. As a company, it is in a special role, as it functions as a monopoly in a highly-regulated field and is owned by the government. The brief was to come up with a new physical gambling game concept for a new gambling chain Feel Vegas aimed at young, highly educated urbanites (as the students are). The brief was very open.

3.4.6 Vaisala

Vaisala manufactures measurement systems mainly for meteorology and the environmental sciences. It also manufacturers electronic measurement systems and equipment for traffic safety, and industrial applications. Vaisala's brief for 2015-2016 PDP course was to create a hand calibrator for industrial wall mounted humidity-temperature meters. The brief was specific, and included drawings and a clear goal for the end state. The goal was to get a functional prototype, which could be moved in to product development.

3.5 Research limitations and reliability

The research has some limitations and factors which may influence on its reliability. These are researcher's involvement with the data gathering and previous experiences with the course, commissioned thesis and the companies chosen to be interviewed.

The chosen research method, case study, has a distinctive feature, as there is "smaller distance between the researcher and his or her research object" (Kasanen et al. 1993 pp.254-255). This smaller distance may not allow the researcher to stay completely subjective, especially when the data is gathered with semi-structured interviews. The nature of semi-structured interviews aims for more open discussion.

I have also participated in the Product development Project (PdP) -course, which was used to gather the data. I participated during the academic year 2012-2013, so it was not during the period which the data for this thesis was gathered. However, as I do have previous knowledge about the project and have been in contact with multiple people before, it might be possible that I utilize my previous knowledge in the analysis of the results.

This thesis is also commissioned by Aalto University, and it is a part of a project *Work life-academia relationships project*. I was able to decide what my topic with the professor in charge of the PdP course and the data gathering context. The aim is to provide valuable information for Aalto University and Aalto University's Design Factory, which hosts the course from which the data is gathered. We chose that the focus could be on the companies, as they are the key driver in these type of courses, and they were not studied in this context earlier. All the knowledge can be used later to improve current relationships with the companies, as well as creating new relationships with better communication on the customer value of Product development Project course and other integrated educational projects. Aalto university's Design Factory, which hosts Product development Project, has also expanded its Design Factory Global Network to 14 universities in X countries so far, which hosts similar project courses and can hopefully benefit from this thesis.

The companies chosen for this research represent only some of the companies participating in product development projects. The companies were chosen based on their previous involvement and their similarities (medium to large Finnish industrial companies), which aimed to improve the quality of the data. However, there are smaller companies, including startups, which participate in product development courses, as well as the Product development Project, but these were left out of the data. Including smaller companies into the data could have provided different findings and possibility for comparison, but smaller companies are structurally more different and analyzing the data collected from these would

have been harder and full of limitations of their own. By focusing on medium to large industrial companies, for example, the participation fee represents only a very small portion of their product development budgets. However, this is a very interesting group to study, and I have included my suggestions for future research to conduct a similar study on this group.

Also, while the companies gave permission to use the companies' names, the fact that some of the representatives requested that they do not want direct quotations to be linked to their companies, might affect the representation of the findings, and limit the discussions out of specific examples. However, as this thesis aims to bring more general knowledge on the customer value, this should not affect the results in broad sense.

4 Findings

Smith and Colgate's (2007) customer value dimensions were used as the basis for the categorization of expected and perceived benefits. The dimensions are: functional/instrumental value, experiential/hedonic value, symbolic/expressive value, and cost/sacrifice value.

During the analysis, three themes were identified from the interviews. The companies expected and perceived value from three different aspects of the course. These are the final concept and prototype, the final report, and the course concept. The course concept theme focuses on the whole course, as a process, which includes, for example, values from interaction with the students and methods used in the course. The findings are introduced according to the three themes in each of the value dimensions.

As noted in the methodology, he companies' names are not linked with quotations, as requested by the companies.

4.1 Expected values

All companies had expected values from the course. Most of the expectations were functional/instrumental and related to either the final concept and prototype or the final report, which were promised results from the course. Most of the companies also had some expectations towards the course concept.

All six companies had functional/instrumental value expectations and cost/sacrifice expectations. Four companies expressed expected value for experiential/hedonic value and five for symbolic/expressive value.

4.1.1 Functional/instrumental

Expectations towards functional/instrumental value were the most common. Amongst the six companies, there were some identical expectations, as well as some unique ones.

Towards the final concept and prototype, the companies had somewhat different expectations, which were mostly in line with their briefs, which they introduced for the students at the beginning of the course. Half of the companies had stricter briefs, usually including somewhat predefined technology, and were looking more for validation. These companies also had clearer expectations towards the functional/instrumental value.

> *"We have an idea portal inside the company where we gather ideas; we choose the most interesting ones which we want to develop further. University projects are great for this… We want meat around the bones".*

> *"We do not settle for only product concepts; we want to think what happens before the product is used, as well as what happens after. We want the whole user journey thought from different parts of the solution."*

The other three companies had more open briefs and were looking for new ideas. The expectations were not as clearly defined and ranged from getting ideas outside of the box, to get new eyes looking at the industry in general.

> *"A Large part of the product development [in our industry] is making small improvements… Now that we begin with a vague idea, which is not inside a pipe vision, we might find that: wait a minute; this can also be done this way also."*

> *"We wanted to get fresh eyes to look our industry in general. We wanted new openings."*

“The goal was to get new ideas for a difficult segment: young, highly educated urbanites (like the students participating in the project)”

“In the brief, I wanted to make sure that the starting point was not a pre-existing [product]."

Toward the final report, many companies expected to get good documentation regarding the final concept and prototype. Some companies had clear expectations towards the business side of the concept.

"We are interested in a business case. The students should analyze the market and conduct some research. We also have a fair amount of data, which we offered and let them process it and think what they recommend that [our company] should do."

Expected values towards the project concept in general, the expectations differed. For some companies, the course was a place to look for future employees, and for some, it was a place to learn something.

"[PdP] is a lot better than interviews [for recruiting], because it has the social aspect, doing together aspect. The company representatives can see how the students function inside a group."

“Product development managers [who are involved with the course] get to see and get to know the students, sometimes there are smart guys whose interests and schedules match [with us].”

"These types of product development courses have very agile product development and prototyping methods, which I was interested to bring to our company, as I am a fan of these methods."

4.1.2 Experiential/hedonic

Four out of the six companies had expectations towards experiential/hedonic value. The experiential/hedonic value expectations were focusing on the course concept and what it includes, such as working with students. This came up in multiple interviews, and it was usually compared to the working environment of their companies. One company representative expressed expectations to feeling happy if the students are happy.

"We want new blood to our company culture."

"[We are expecting] to get inspired, and to keep our minds fresh from [working with] fresh, young minded, students. So, the emotional side is there also."

"I am happy if the students are happy."

4.1.3 Symbolic/expressive

Five out of the six companies had symbolic/expressive expectations towards the course. All the expectations were towards the course concept in general. There were no clear symbolic/expressive expectations towards the final concept and prototype nor the final report.

The symbolic/expressive value expectations were mostly communication towards the students. The company representatives expected that the course would give a positive image

of the company in the eyes of the students. The company representatives noted that amongst the students there are many potential future employees and that the course would make the companies look more desirable.

> *"We want to brighten our employer image in the eyes of the students, [who are] young and well educated so that they would see us as a potential employer."*

One way the companies aimed to accomplish positive employer image by introducing interesting brief for the team. This would keep the team motivated and could show challenging and intriguing side beyond the companies' regular products.

> *"[We designed] a brief which is challenging enough, and as it is also marketing towards the students it has to meaningful and challenging enough so that the students enjoy working on it, as it is a long course."*

One company also expected to get a positive image as a company in the eyes of other stakeholders, beyond the students. This came from a company, which have had more experience with the course and a long relationship with Aalto University in general.

> *"We want to maintain the relationship with the whole university. This way we know what is happening there, and they know what is happening at our company."*

4.1.4 Cost/sacrifice

The expected costs/sacrifices were very similar amongst the companies. All companies mentioned the participation fee of 15 000 euros and time. The expected sacrifices related mostly to the final concept and prototype and the course concept. Towards the final report,

only one company mentioned that they were prepared to provide their data for the students, which they could use in the analysis.

Towards the final concept and prototype, the companies were expecting to sacrifice the most. Many of the companies noted that the time is the most crucial resource. The companies which had more experience with the course expected that the time they put into the course influences the outcome. Also, out of the 15 000 euros participation fee, 10 000 goes to the team and is used for developing and producing the final prototype. Overall the companies were willing to sacrifice resources in order to get good results.

> *"We had reserved at least enough resources. We were prepared to help [them] to build a large prototype."*

> *"On the financial side, we were prepared to offer more, if the prototype would not be done without. We also had a prototyping facility for them, if they would have needed it."*

> *"I was ready to give my time and other resources as much as the project needs it."*

> *"It [PdP] requires input from us. It is not worth it if we are not able to commit the right amount and the right people."*

The attitude towards the fee was also seen in positive light, especially compared to the potential the course offers. None of the companies mentioned that the cost was too high. Two companies mentioned that finding the money, or the department which would take the ownership of the project, and the budget, took some effort.

"The potential benefits for the price are great, especially if you think how much consulting time 15 000 euros would buy. Those guys would not sit at the office for many weeks for that amount".

The companies also expected costs/sacrifices in providing facilities and helping to build the final prototype, if necessary. These included the use of their facilities, getting help from experts and to get necessary equipment, parts, and devices.

"We offered our prototyping studio for the students for building the prototype."

The cost/sacrifice expectations toward the course concept were mostly time-related. The course had some mandatory events for the representatives. At the beginning, the companies pitched the ideas to teams in order to find the right team for their project. After the companies and teams are matched there is a daylong PD6, product development in 6 hours, in which the teams go through the whole product development process sin six hours with their respective representatives. There are also mid-point checkups and the final gala, which require the presence of the representatives. Besides these, the companies and the teams chose the frequency and places of the meetings. Beyond team meetings and the mandatory events, the companies expected to sacrifice their time in other ways also, for example by organizing knowledge transfer.

"We reserved time for deep induction into the subject. We had prepared an information transfer pack."

The companies also expected to sacrifice time by organizing events and visitations for the students. All the companies hosted their teams at their headquarters and or factories to introduce their respective companies. Some companies organized extra events at their companies or at their customers' locations, which were involved with the project.

The amount of expected sacrifices regarding time were not predefined by any of the companies. Some of the representatives sacrificed their personal time to participate in the project.

> *"I had not budgeted the time [into work time], it was more a hobby for me."*

4.2 Perceived values

All companies perceived value from the course. The most common dimension of value the companies perceived was functional/instrumental, which was in line with the expectations. Overall, the companies perceived more values, than expected.

4.2.1 Functional/instrumental

All six companies perceived functional/instrumental value from the final concept and prototype. This value ranged from new ideas to a fully functioning prototype, which was developed very far and with which the representatives were very impressive.

In line with the expectations, the perceived functional/instrumental value differed between the companies who had stricter and broader briefs. The companies who had broader briefings were not able to pinpoint the value but mentioned new ideas in general.

> *"Our project team ideated on very broad scale towards the end prototype and this lead to a lot of new ideas how we can approach our target segment.*

The companies with more specific briefs perceived clearer functional/instrumental value from the final concepts and prototypes. All the companies which were looking for validation

to a predefined technology or a specific problem got more or less the results they were looking. Even though one validation was that the technology was not mature enough, which affected the team spirit and the end prototype in a negative way, all companies were happy that they got at least some suggestion. The company representative mentioned that the validation, even though it was negative, was valuable information. One of the companies looking for validation was very happy with the positive results.

> *"We were able to make further suggestions if the prototype goes into further development and we were even able to validate the idea [using the prototype] with our sales representatives, who know what the end customers want."*

While all the companies were happy with the final concepts and prototypes, some noted that the concepts could have been even better. Some of the blame was towards the teams, while some were towards the company and the original brief. Also, the students' skill levels came up in few interviews. One company saw it as a limiting factor that the team's skillset was spread out to different fields, and so resulted in " a little bit of everything" results, rather than more focused on one area. Another representative mentioned that the team was able to outsource some of the skills they did not have, which ended up working well. Overall the representatives mentioned that they could have affected the outcome with better guidance.

> *"We saw that the prototype could have been developed further. There were many aspects which were not thought at all."*

> *"The result was good, but I think we have some learning to do for the future. We should think more clearly how the prototype would be utilized after it was done."*

"In my mind, our engineers directed the project to little wrong direction. One reason for this was also YT negotiations, which resulted that the main engineer got fired."

The perceived functional/instrumental value from the final report came up in three interviews. One company representative would have wanted more detailed documentation regarding the final concept and other ideas the team had thought, as it is valuable in future phases of product development inside the company. The other two representatives who mentioned the value in the final report were both very impressed. The values from the final report ranged from getting great customer information to documentation of different concepts.

"The students are anonymous, and it is visible in their feedback. The findings go beyond our company, all the way to our competitors' offerings. Another benefit of a student asking questions is that the stakeholders, like our customers, are more willing to explain the issues in more detail, compared to if our expert is asking. This brought up new needs and better understanding for the basic needs."

"They [the student team] conducted marketing research by interviewing potential customers and looked at competitors' offerings. These are all valuable information [for us]."

"In the final report, there were suggestions for a business model, target market and to whom to target. We also got different conceptual solutions to the problem we presented for them. These are valuable so that we know what kind of solutions have been considered already.

The companies also perceived functional/instrumental value from the course concept. Many of the companies got summer employees or thesis workers, even companies which were not

expecting this. One of the companies were so impressed with the team and the project that they ended up hiring two summer employees from the team. Beyond employees, one representative mentioned that the final gala resulted in interesting conversations with representatives from other companies and new business contacts.

Another functional/instrumental value from the course concept came in the form of new knowledge and learning new skills and working methods. One representative noted that the technology the team used was totally new for him and he learned a lot about it and its potential. The most common value the representatives perceived was regarding the design thinking ideology and methods, which are in use during the course. These include lean and agile product development, co-creation, customer centricity, multidisciplinary team work and PD6.

> *"[The engineers involved with the project] learned about co-creation, as it can only be learned by participating… they also learned to better utilize industrial design and industrial designers. Or at least the threshold has lowered, and the prejudices towards industrial design changed."*

> *"Just yesterday I organized inside our company a small 4-hour innovation workshop, which is similar to the PD6 [product development in 6 hours]."*

4.2.2 Experiential/hedonic

Five of the six companies perceived experiential/hedonic value. Most of the perceived value was related to the course concept, mostly on working with the students. This was in line with the expectations. Some of the companies also perceived experiential/hedonic value from the final prototype. The final report or parts of it were not mentioned.

While all companies were happy with the final prototypes and received functional/instrumental value from it, couple representatives mentioned that they also perceived experiential/hedonic value. Two companies mentioned that the teams were very

impressive with the effort on developing and building the end prototype. Two companies also brought up the aesthetics of the final prototype.

> *"It was positive surprise how tremendous effort the students had when building the prototype."*

> *"The [final prototype] was damn good looking, which I was not expecting. Even the chairman thought so, who visited the final gala."*

> *"The final prototype was really good looking… Overall, the stand at the final gala was really nice. It was a success."*

From the course concept, the companies perceived experiential/hedonic value from the teamwork, working with students and from the environment, the course operates in Aalto Design Factory. The main point of these findings was that they were different compared to the usual working methods and environments of the representatives. Student teams are generally full of young and positive individuals who have chosen to participate on the course. For some companies, the presence of students was valuable, and for some the way they worked.

> *"I was positively surprised that we had an exceptionally great team. They went voluntarily to London to participate in a fair… They showed interest in everything we suggested, like traveling to Jyväskylä [for visitation] … The dedication was surprising."*

> *"Working with students is a breeze of fresh air, it is nice that our employees could also go little wild, it does good for them. It is therapeutic for them, because unfortunately [that kind of] freedom is limited here."*

"It is some kind of lifeline to work with young students. It brings euphoria of freedom, as otherwise, everything is so serious."

"[Working with students] is a fresh breeze from the world outside [our company] ... Students, who bring new openings and excitement are overall uplifting."

The environment the course operates in, Aalto Design Factory (ADF), is an innovative collaboration platform to where professors can bring their courses. The ADF has multiple rooms for teamwork, which all have different themes, ranging from fat boy lounge to all-white room. There is also a machine, electrical, paint, print, and wood workshops, which are all available for the students. The ADF hosts multiple courses and startups and the atmosphere are open.

"This [Design Factory] is a great place to test new ideas. I know there are zero experts [of our field] around. No one has pipe vision there."

4.2.3 Symbolic/expressive

All six companies perceived symbolic/expressive value. Most of the value was related to the course concept and focusing on the visibility of the companies, as most companies expected. The final concept and prototype were also perceived as having symbolic/expressive value.

The final prototype was a way for companies to demonstrate their participation in PdP. The companies got a lot of visibility at the final gala, where all the teams present their final concepts and prototypes to a large audience, including students, from PdP and external, company representatives, from PdP and external, university faculty and media representatives.

“I remember getting new [business] contacts at the final gala. They had visited our stand, came up with ideas related to the final prototype and left their business cards.”

“It [PdP] is a possibility to brighten the image as an employer inside the company… I put a post to our intranet about the final gala and over ten people came to look at the result."

Some companies also displayed the final prototype at their office or factory, to showcase the project they are involved in, and at the same time gain positive employer image in the eyes of their current employees. One company also organized an event, in which they could show the prototype to their other stakeholders, whom could provide feedback if there is interest for the product.

"We had the final prototype in the lobby of our product development department. It was there for a day, and people were able to see it and to stop look at it when they passed by… We also organized two presentations of the prototype."

“We were able to maintain our image as a company which pushes things forward at the eyes of our other stakeholders [by introducing the final prototype for them].”

“Couple people contacted me after PdP and left open applications for jobs and thesis positions. I spoke with them at the gala.”

Many of the companies also mentioned that they reached out to their stakeholders during the project by organizing visitations. This was a way to show the stakeholders that the company is participating in innovation projects and aims to develop innovations continuously. One

company also mentioned that they sent out the final report to the stakeholders who were more involved with the project. The same company also displayed brochures and other material at their headquarters' lobby, to spread the information to all visitors.

> *"We are in B2B business, and it is also marketing towards our customers when we travel to visit them, and they see that we are participating in this kind of a project… We also send the final report to customers who are more involved with the projects... We have also put brochures and pamphlets into our lobby so that our visitors and customers see that we are part this collaboration."*

The companies perceived symbolic/expressive value from the course concept in general. By participating the companies could display themselves as interesting and potential employers, which participate in interesting projects. The course format allowed this to be done in multiple ways, from giving interesting briefs, to organizing visitations to both the company' and customers' premises, and to be personally involved with the students.

> *"We were able to showcase our company in wide perspective. What kind of company we are and how we function."*

4.2.4 Cost/sacrifice

All companies perceived costs and sacrifices. Time was mentioned as the most valuable resource the companies sacrificed for the course. For most of the companies, the participation fee represented the majority of the monetary costs. The final prototype and course concept were mentioned most often regarding costs/sacrifices. The final report was mentioned only once.

The development of the final prototype required some extra sacrifices from the companies, beyond the 10 000 euros budget the teams received, which is part of the participation fee of 15 000 euros, the companies pay. The companies borrowed and sometimes gave equipment

and special parts for the final prototypes. In most cases, the companies had no problem providing the parts and equipment, but for some, the requested parts required extra effort. None of the companies mentioned that the final prototype required any extra money, nor facilities, even though some companies were prepared to provide these.

> *"We provided [equipment] for the final prototype. They were somewhere between couple hundred and couple thousand euros."*

> *"We got lucky that we happened to have large touch screen computers [when the students asked for them]. They are very expensive."*

The perceived costs/sacrifices regarding the final report came up in only one interview. The company had provided their data, which they gave for the team. The final report mostly consisted documentation regarding the whole product development process and details regarding the final concept and prototype.

The most common sacrifice the companies mentioned was time. In general, the course required active participation from the representatives. All companies ended up organizing extra visitations and events for their teams. The amount of time the companies sacrificed for the course varied. Most of the companies had one main contact person, but one company had three main contact persons to make sure they were always available. All the companies also involved co-workers in some points, who were not actively involved with the project. Organizing field trips, visitations, and other events also took time from the representative and in some cases required extra personnel.

> *"I had 2-3 colleagues involved, and they spend around 10 to 15 hours for the project."*

> *"We had a core team of three people. This way we always had someone available... We were able to maintain short response time."*

"I think I visited our team at Design Factory around ten times, usually for around two hours at a time."

"Field visits take up resources. It required 1 or 2 people from our company, organizing the travels, hosting in general, and protective gear and clothes, which we had to provide. These result to some expenses."

"I took the students to show & dinner event, as a middle point thank you. I also organized an escape room and dinner event as a team spirit builder."

The companies mentioned that they perceived costs/sacrifices also from the course concept. Even though the actual expenses and sacrifices varied between the projects, none of the companies mentioned that the course took too much resources. Most of the companies even mentioned that the course provided a lot for the cost, at least compared to the potential the course has, as the final result is unknown at the beginning. Overall the companies were all satisfied with the project.

"It is cheap compared to how much it would cost for us to do a six-month project [inside our company]."

"The project results in some expenses [beyond the 15 000 euros participation fee], but they are quite small… The 15 000 euros from the budget is not a big effort… Finding the owner of the project is a challenge."

"It required little investment to get the validation."

"Worth the investment."

4.3 Summary

Here, the key findings of the research are summarized. The participating companies had varying expectations and perceptions towards the customer value. The values the companies perceived were towards three aspects of the course. These were the final concept and prototype, the final report, and the course concept. The expected values were mostly focused on the final prototype and the final report. The course concept offered values, which the companies were mostly not expecting, and which were not amongst the promised results of the course.

Regarding the final concept and prototype, the most expected and perceived value dimension was the functional/instrumental. The expectations towards the final concept and prototype differed, as half of the companies were looking for validation to a specific issue or technology, and half of the companies were looking for new ideas in general. However, they all expected mostly functional/instrumental value out of it.

The same division was present with the expected and perceived customer value towards the final report. The companies which were looking for validation had more clearly defined expectations and expected business cases and market research, while the companies aiming for new ideas, expected less value. The most expected and perceived value dimensions towards the final report were also functional/instrumental.

The course concept provided expected and perceived mostly in the symbolic/expressive dimension, but also in functional/instrumental. These values were mostly not expected by the companies.

Overall, the perceived values were mostly in line with the expectations. While all companies expected and perceived functional/instrumental and cost/sacrifice values, two companies did not expect experiential/hedonic values, and one did not expect symbolic/expressive value. All companies perceived all value dimensions, expect one company did not perceive experiential/hedonic value (Table 3, below).

	Expected value	**Perceived value**
Functional/instrumental	6 out of 6	6 out of 6
Experiential/hedonic	4 out of 6	5 out of 6
Symbolic/expressive	5 out of 6	6 out of 6
Cost/Sacrifice	6 out of 6	6 out of 6

Table 3. Findings: Expected and perceived values in number of companies by value dimension

In the amount of different value attributes and outcomes, the functional/instrumental value dimension was the most common. All other value dimensions had similar amounts of expected and perceived attributes and outcomes (Table 4).

	Expected value	Perceived value
Functional/instrumental	Functioning prototype Final report Market research Business case New employees New ideas New perspectives Validation Learning	New ideas New insight New knowledge New concepts Validation Documentation of different ideas Market research Customer information Summer employees Thesis worker Learnings New methods New business contacts
Experiential/hedonic	New experiences Enthusiast people Satisfied students	Enjoyment from the team New experiences Change to normal Great aesthetics on the prototype Great communication
Symbolic/expressive	Positive employer image Visibility towards students Visibility towards university	Positive employer image Visibility towards university Visibility towards own customers Positive employer image inside the company Brand awareness
Cost/Sacrifice	Participation fee Extra money Facilities Time Equipment	Participation fee Extra expenses Work time Co-workers time Free time Equipment

Table 4. Findings: Value attributes in value dimensions

5 Discussion

The aim of this study was to gain new knowledge and understanding for the customer value in university-industry collaboration context, more specifically, in product development courses. This was done by testing an existing framework for categorizing customer value dimensions (Smith & Colgate 2007). The research approach was action-oriented (Kasanen et al. 1993), which aims to provide both theoretical and practical findings. The chosen method for the research was a multiple case study, in which the data was gathered by conducting semi-structured interviews. The data was then analyzed and coded. The findings, which were introduced in the previous chapter are discussed in this chapter.

This thesis aimed to answer what customer value companies expect and perceive when participating in product development project in industry-university collaboration. The findings revealed three themes, which provided customer value for the companies. The themes are (1) the final concept and prototype, (2) the final report, and (3) the course concept. The course concept includes all aspects of the Product development Project course, as an academic year-long process, such as the interactions with students and other activities, the product development process, events and so on.

The first finding and theme, the final concept and prototype, came up as the most concrete value provider. This is logical, as it is one of the two end results, which are promised for companies at the beginning of the course. The final prototype is a physical, functioning prototype, which aims to solve the challenge or problem the companies introduced in their briefs. The most common value dimension regarding the final concept and prototype was functional/instrumental. Functional value is found to be the primary driver for customer choice (Sheth et al. 1991). The expected and perceived values towards the final prototype ranged from getting new ideas in general, to gain new knowledge on a specific technology and validation.

The second promised end result was the final report, which also came up as valuable. The difference between the companies' expectations and perceptions were very different towards the final report. For some companies, it was very important, and they had clear expectations

from it, for example in the form of a business case, while some of the companies did not even mention it. The expectations towards the final report were correlating with the original goal of the briefs. The companies who were looking for validation, expected more value from the final report and the companies who were looking for ideas were not.

The third finding, the course concept, concludes that the companies also perceived value beyond the promised end results of the course. The course concept provided additional value beyond the core value (Grönroos 2000), which were promised. This theme included all value from the course concept, besides the final concept and prototype and final report. Some of the companies learned new working methods; some got inspiration and some employees. These perceived values were not expected as much as the values towards the final prototype and the final report. The course also included events such as the final gala, which all companies found valuable, both in the form of getting visibility and more concretely getting new contacts and potential employees. Regarding this finding, most of the companies noted that they could influence the success of the project, by participating actively.

The findings also revealed the dynamicity of expected and perceived customer value concept. The companies with representatives who had participated in the course often, two or more times, had expected and perceived values more in line, compared to representatives, who had only a little previous experience with the course. In the companies where the representatives had previous experience with the course, the expected values were more realistic. Woodruff and Gardial (1996) noted that customer's judgments of perceived value change across situations and time. The findings of this research suggest that the customer value is indeed a dynamic concept and that both expected *and perceived* customer value changes over time. This suggests that the moment a research is conducted only represents a snapshot of the customer value. While not surprising nor novel finding, it is an important finding for a researcher or a manager to be aware, while conducting research into customer value, as each of us not only value the same things differently, we also do it differently at different times (Woodall 2003).

Previous research has shown that previous experience correlates with a success of university-industry collaboration (Bruneel et al. 2010). This is also present in the findings of this research, as the companies with more experience have more realistic expected customer

value. This, with the fact that all the case companies have participated in the course multiple times, KONE up to 18 times, supports the finding that the companies are perceiving customer value from the course through assessing the benefits and sacrifices (Zeithaml 1988).

The framework for categorizing customer value dimensions by Smith & Colgate (2007) was chosen for this novel research into customer value in university-industry context. The framework was chosen as there are no specific customer value frameworks developed for university-industry context, and it was developed to work in both business-to-customer and business-to-business contexts, as well as for goods and services. While university-industry context is closer to a business-to-business context than business-to-consumer context, and there are some frameworks designed for business-to-business, they were not chosen, as they are developed to examine only some aspects. For example, Ulaga's (2005) popular *relationship value drivers* -framework is very specific to buyer-supplier relationships, which includes only a small part of product development processes.

The chosen customer value dimensions, functional/instrumental value, experiential/hedonic value, symbolic/expressive value, and cost/sacrifice value (Smith & Colgate), allowed categorization of all found values. During the analysis and categorization of the findings, the relational value, which Tynan et al. (2010) suggested as a fifth category to Smith and Colgate's (2007) dimensions, could have been used as an own dimension in this research. While this dimension focuses, and highlights the value of a relationship and a brand for the customer, the same values were easy to categorize under the dimensions by Smith and Colgate (2007). In this sense, the relational value is not an own value dimensions, but rather a group of value attributes. For example, the positive image companies perceived by being associated with the university can be categorized as symbolic/expressive value. Overall, the dimensions Smith and Colgate (2007) suggested allowed categorization in this context and provided a novel way to examine university-industry collaboration.

In the interviews, the companies' representatives evaluated the attributes and outcomes rationally, which Woodall (2003) noted as a characteristic of a business-to-business customer. This is important when analyzing customer value through benefits/sacrifice perspective, as it relies on rationality (Gummerus 2013). The interviewees expressed both

individual and company's perspectives during the interviews, which is in line with the note that even in business-to-business context, and in university-industry context, there are individuals who determine the customer value (Woodall 2003).

The customer value attributes and outcomes identified in this research corresponded with the benefits and sacrifices Woodall (2003) had identified. However, the findings of this research were more specific. Sánchez-Fernández and Iniesta-Bonillo (2007) noted that the perceived value is always context specific, and as the findings of this study are more specific, they provide better contextual understanding and make the findings more usable. Woodall's (2003) attributes and outcomes are on a very high level, compared to the findings of this research, which is understandable, as they are a result of a literature reviews. An attribute like "service quality" is very vague and has similar problems with conceptualization as customer value (Zeithaml 1988; Sánchez-Fernández & Iniesta-Bonillo 2007). More concrete and insightful findings are more useful. For example, while Woodall (2003) had *knowledge* as a benefit outcome, this research found that the *documentation of the concepts and knowledge* was perceived valuable. The overall usability of high-level attributes and outcomes are not as clear as the more specific ones, especially managerially.

6 Conclusions and implications

The objective of this thesis was to gain knowledge of customer value in university-industry collaboration context and provide both theoretical and practical implications. The theoretical focus was to contribute to the customer value research in product development courses in university-industry context, from the point of view of the participating companies. The practical focus was on providing knowledge for both universities and companies which are involved in product development courses in university-industry collaboration context to enable better value co-creation.

The findings, discussed in the previous chapter, provide both theoretical and practical implications. Next, the implications are introduced, followed by suggestions for future research.

6.1 Theoretical implications

The aim of this study was to provide an understanding of customer value in university-industry context, especially in product development courses. This is a unique and novel perspective to this topic, and it provided a holistic approach to examining the customer value in university-industry collaboration. Beyond offering a holistic view of the customer value, this thesis also provided a more detailed view into the customer value in the university-industry context.

The application of the chosen framework revealed both expected and perceived customer values. This research specified that the dimensions are applicable in university-industry context. The research also identified context specific customer value attributes and outcomes, which are present in product development courses. These context specific attributes and outcomes are more detailed, compared to the higher-level attributes and outcomes found in previous customer value research, in university-industry collaboration context.

The findings of this study suggest that the chosen framework provides a fruitful basis for exploring customer value in other contexts, including university-industry context. The framework was designed to work both in business-to-business and business-to-customer contexts, as well as for goods and services. Product development courses aiming to develop physical products, like the Product development Project, include both goods and services.

6.2 Practical implications

The findings of this study provide practical implications to both universities and companies. The findings allow both to gain a better understanding of the current collaboration and how it can be developed further. By understanding the expected and perceived value universities and companies can both focus on certain areas when designing or making decisions on future collaborations. Next, the practical findings are introduced for universities and companies.

6.2.1 Practical implications for universities

The findings of this study provide practical implications for Aalto University, which commissioned this thesis, as well as to other universities, who are planning product development courses involving companies. Simply by understanding that companies expect and perceive customer value in many dimensions, offers insights and knowledge, which can provide guidelines for designing future courses as well as maintaining and developing new relationships with companies.

The findings suggest that participating companies expect and perceive values beyond the promised final results. The course concept enables additional value to be created for companies through different activities, events, and interactions. The universities should keep this in mind when designing product development courses. The companies should be allowed and encouraged to be involved during the whole product development process to enable the value co-creation.

The potential customer values for companies should be communicated more broadly. The Product development Project for instance, offered additional customer values for companies, which are not currently communicated, nor expected by the companies. These included, but were not limited to, finding new employees, possibility to learn new working and communication methods, and allowing the employers to gain new experience and inspiration by participating. More effective communication could be done by developing a value proposition based on the identified customer values in this research. By communicating the potential customer values, and the customer values other companies have perceived, universities can allow the participating companies to adjust their expectations and involvement accordingly, and attract new companies.

6.2.2 Practical implications for companies

The findings of this thesis provided knowledge and practical implications for companies which participate in universities' product development courses. The courses can provide customer value beyond the promised end results. By being actively involved with the product development process, the companies can receive additional customer value.

Companies can also utilize the course in their overall marketing to different stakeholders. The participation in product development courses can be communicated to the companies' employees and other stakeholders, to show that the company is actively aiming for new innovations. More employees from the companies could also participate to the course to spread the potential learning and motivation amongst the employees.

Product development courses offer a great venue for finding potential employees. The representatives from the companies can see how students function in teams under pressure. The project manager is especially in a challenging role, as he or she oversees the team and the project. Companies could involve HR departments and the managers who make decisions on new hires.

6.3 Suggestions for future research

During the research, multiple potential future research avenues were discovered. The university-industry collaboration overall has seen a limited amount of research. These collaborations offer potential, and as the world becomes ever more digitalized and universities often are at the forefront of technology development.

Inside the university-industry collaboration context, product development courses are also potential research avenue. This thesis was focusing on medium to large industrial companies and neglected small companies, including startups. These companies could offer new perspectives, expectations, and perceptions of customer value. If similar research is conducted on smaller companies, the findings could also be compared with the findings of this research.

The themes identified in this thesis: final concept and prototype, final report, and course concept offer a foundation for developing more specific value dimension frameworks in this context. Specific framework for university-industry context could provide valuable knowledge for the context in general.

The dynamic nature of customer value in this context is also a potential research avenue. By conducting research which follows companies in different points along a product development course, could provide new knowledge to how the expected and perceived customer value evaluations change over time.

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8 Appendices

8.1 Questions for the companies

Warmup questions (aim to get the interviewee to the right mindset: thinking about the course and the last project)

Ensin haluaisin kysyä, sopiiko että nauhoitan haastattelun ja yrityksenne nimi mainitaan työssä. Teitä ei?

Voisitko seuraavaksi esitellä itsesi ja yrityksesi lyhyesti: eli nimi, organisaatio ja titteli.

Kerrotko oman yhteyden PDP kurssiin.

- Kuinka monta kertaa olet ollut mukana PDPssä teidän firman osalta?
- Kuinka monta kertaa yrityksenne on ollut mukana PDPssä?
- Milloin osallistuit ensimmäisen kerran?

Hyvä. Seuraavaksi keskitytään edellisvuoden kurssiin ja lopuksi muutama kysymys PDPhen yleisesti.

Mikä teidän brief oli viime vuonna?

- Olisitteko lähteneet kehittämään tätä ideaa yrityksen sisällä, jos ette olisi tuonut sitä kurssille?

Miksi lähditte PDPhen mukaan viime kerralla?

- Minkälaisia hyötyjä odotitte saavanne yhteistyöltä? (Paljon jatkokysymyksiä, esimerkkejä jos ei löydy)
- Okei, odotitte tälläistä... oliko se sellaista mitä odotitte? Mitä konkreettisesti saitte? (Paljon jatkokysymyksiä, esimerkkejä jos ei löydy)
- Oliko jotain muita lopputulemia yhteistyöstä mitä ette osannut odottaa?
- Kun lähditte mukaan, mitä te olitte ajatellut että mitä yhteistyö edellyttäisi teidän puolelta? (Jatkokysymyksiä, esimerkkinä resursseja jne.)

- Mitä sitten käytännössä panostitte yhteistyöhön? (Jatkokysymyksiä, esimerkkeinä resurssit, tarvittaessa kysy erikseen: raha, tavarat, aika)
    - Keitä oli mukana yrityksenne puolelta sinun lisäksesi (actors)?
    - Mitä resursseja yrityksenne panosti kurssin aikana (resources)?
    - Missä aktiviteeteissa yrityksenne oli mukana (activites)?

Hienoa! Nyt voisin kysellä muutamat yleiset kysymykset teidän kokemuksista PDPssä (Yleisiä / konsultatiivisiä kysymyksiä).

- Onko jokin muuttunut teidän yrityksenne PDP-yhteistyössä sinä aikana, kun olet itse ollut yhteistyössä mukana?
- Miten PDP staff voisi parantaa / helpottaa teidän osallistumista jatkossa?

Loppuun mukavan laajat kysymykset (voi nousta mitä vain, voi johdatella takaisin jos tulee jotain mieleen)

- Mistä pidät PDPssä?
- Mistä et pidä PDPssä?

8.2 Questions for the teacher in charge of PDP

Voisitko esitellä itsesi ja yrityksesi lyhyesti: eli nimi ja organisaatio.
Kerrotko oman PDP taustasi omin sanoin.

Teikäläisellä on hyvä kokemus tästä näin, 20 vuotta oot ollut pyörittämässä kurssia, oot nähny paljon ja ollu paljon näiden yritysten kanssa tekemisissä, mikä on ehdottomasti tässä se kiinnostava osuus.

Mitä sun mielestä nää sponsoriyritykset merkitsee tälle PDP:lle, koko kurssille ja sitten opiskelijoille ja yliopistolle?

- Onko sponsoriyritysten rooli muuttunut historian aikana?
- Mitä etuja ja haittoja yritysten mukana olo tuo?
- Miten hankitte uusia yrityksiä?
    - Miten lähestytte uusia yrityksiä?
    - Mitä lupaatte yrityksille, jos he osallistuvat?
    - Mitä kaikkea yritykset saavat kurssilta? Tai ovat saaneet?
    - Mitä kaikkea yritykset antavat / uhraavat?
        - Onko yritysten välillä eroja uhrauksissa?
        - Oletko nähnyt merkitystä uhrauksilla projektin menestykseen?

8.3 Questions for the teaching assistant of PDP

Voisitko esitellä itsesi ja yrityksesi lyhyesti: eli nimi ja organisaatio.
Kerrotko oman PDP taustasi omin sanoin.

Minkä takia lähdit PDP assistentiksi?
Mitä kaikkea PDP assistentin rooliin kuuluu?

Miten hankitte sponsoriyrityksiä?

- Mikä oli teidän pitch?
- Value proposition?

Minkälaista palautetta olette saaneet projekteista yrityksiltä?

- Onko siellä noussut jotain erityistä?

Ketä kaikkia Aallon työntekijöitä on mukana PDP kurssissa?
Ketä henkilöitä yrityksistä on yleensä mukana?
Mitä resursseja yritykset uhraavat kurssille?
Mitä resursseja yliopisto antaa kurssille?
Mitä aktiviteettejä kurssilla tehdään eri stakeholderien väleillä?

8.4 Product development Project -course info

Kurssin asema

Mechanical Engineering, Advanced Studies

Kurssin taso

Master's studies

Opetusperiodi

I-V

For practical reasons, the course lasts for the whole academic year. The introductory lectures and getting started with the teams last for first period. The project is completed during periods II-V.

Työmäärä toteutustavoittain

The basic course stands for 10,0 ects. The credits can be extended up to 15,0 ects by participating extra workshops and/or when selected for a team leader. That process will be explained at lectures.

Introductory lectures 24 h

Checkpoint meetings 14 h

Project planning, execution, reporting and exhibiting the results 240 h

Osaamistavoitteet

After working in an interdisciplinary team, the students are familiar with project working from idea to prototype, including prototyping, testing, finishing and reporting. They understand the challenges related to this kind of development work and are better prepared to choose proper methods and tools for tackling such challenges.

On individual level, every students has better insight on his or her own expertise, both strengths and limitations. The course offers a lot of chances to enhance the existing skills, or to learn completely new ones.

Sisältö

Students form interdisciplinary teams of ca. 10 individuals. The teams learn product development by completing a comprehensive learning project from idea to prototype in partnership with companies. The teams are provided with a budget in order to complete their prototype. The results are exhibited to the public in the Product Design Gala during Aalto Festival week in May.

Toteutus, työmuodot ja arvosteluperusteet

The assesment is based on four criteria: final result, project working, applying of proper product development methods and tools, and communication.

The teaching team evaluates the project plan, execution, checkpoint meetings, development process, prototyping and testing activities, final report and the demonstrations at the final gala. The feedback from the industry partner is concidered, as well as the self evaluation from the team. The final grade is agreed with every team in the last meeting.

Oppimateriaali

Lecture slides. e-Handbooks and other instructions shared at MyCourses.

Ulrich-Eppinger: Product Design and Development (any edition).

Korvaavuudet

The course substitutes the old course Kon-41.4002 Product Development Project (10,0 ects)

Esitiedot

No exact prerequisites. However, the course is designed to be taken at the final stage of studies.

Arvosteluasteikko

0-5

Opetuskieli

English.

Lisätietoja

The course is designed for any student, who is interested in development of consumer or investment goods. In order to form interdisciplinary teams, students from any Aalto Schools are warmly welcome. Although immaterial components, e.g. services and business concept are often included, the focus is in development of tangible products.

The popularity of the course has grown systematically, and in theory we may need to limit the number of participants for practical reasons. Shall that ever happen, the selected numbers of participants from Aalto schools are

ENG=60, ELEC=30, SCI=30, CHEM=30, BIZ=30, ARTS=30

In selection, the earned credit units will count, but only within the school cohorts.

More information about the course: target=_blank>http://pdp.fi/